

# THE SYPHILIS EPIDEMIC IN A NEW WORLD: A MATHEMATICAL MODELLING STUDY OF CHANGES IN TESTING FREQUENCY AND COVERAGE, RISK BEHAVIOUR AND SCALE-UP OF HIV PRE-EXPOSURE PROPHYLAXIS AMONG AUSTRALIAN GAY, BISEXUAL AND OTHER MEN WHO HAVE SEX WITH MEN.

Wilkinson AL<sup>\*1,2</sup>, Scott N<sup>\*1,2</sup>, Luong P<sup>1</sup>, El-Hayek C<sup>1</sup>, Wilson DP<sup>1</sup>, Fairley CK<sup>3,4</sup>, Zhang L<sup>3,4</sup>, Roth N<sup>5</sup>, Tee BK<sup>6</sup>, Hellard M<sup>1,2,7</sup>, Stoové M<sup>1,2</sup>

\*Authors Wilkinson AL and Scott N contributed equally to this abstract.

<sup>1</sup>Burnet Institute, 85 Commercial Rd, Melbourne VIC 3004, Australia.

<sup>2</sup>School of Public Health and Preventive Medicine, Monash University, Alfred Hospital, Commercial Rd, Melbourne VIC 3004, Australia.

<sup>3</sup>Melbourne Sexual Health Centre, Alfred Health, 580 Swanston St, Carlton VIC 3053, Australia.

<sup>4</sup>Central Clinical School, Faculty of Medicine, Nursing and Health Sciences, Monash University, Commercial Rd, Melbourne VIC 3004, Australia.

<sup>5</sup>Prahran Market Clinic, Pran Central, Mezzanine Level, Cnr Commercial Rd and Chapel St, Prahran, Melbourne VIC 3181, Australia

<sup>6</sup>The Centre Clinic, 77 Fitzroy St, St Kilda Vic. 3182, Australia

<sup>7</sup>Infectious Disease Department, Alfred Health, Alfred Hospital, Commercial Rd, Melbourne VIC 3004, Australia.

**Background:** Syphilis control remains a challenge in many high-income countries, including Australia. Syphilis diagnoses in Australia are concentrated among gay, bisexual men and other men who have sex with men (GBM), with transmission rates higher among HIV-positive GBM. The scale-up of HIV pre-exposure prophylaxis (PrEP) has generated urgency about finding strategies to control syphilis due to potential condom reduction.

**Methods:** We used local surveillance data from high GBM caseload primary care clinics to parametrise a dynamic compartmental model of syphilis transmission among GBM, stratified by HIV status. Projected outcomes were annual syphilis incidence and prevalence 2017-2025 under a baseline scenario and seven testing coverage, frequency and sexual risk behavior change scenarios which included HIV PrEP scale-up.

**Results:** The model estimated that among HIV-negative GBM, increasing syphilis testing coverage (from 69% to 75%) and frequency (from ~8-monthly to 6-monthly) could prevent a cumulative 35% and 66% of syphilis cases respectively, or 77% of cases when combined (2017-2025). Under a scenario of 20% of HIV-negative GBM commencing HIV PrEP, the impact of increased serodiscordant sex and reduced condom use, alongside increased syphilis testing linked to PrEP visits, resulted in a projected 14% increase in overall syphilis cases between 2017 and 2025 (a 25% increase in HIV-negative GBM and a 10% decrease in HIV-positive GBM). Decreased syphilis testing frequency (from ~4-monthly to every 6 months) associated with less frequent visits for routine HIV care resulted in large increases in syphilis cases (210%; 2017-2025) among HIV-positive GBM.

**Conclusion:** Frequent testing remains central to syphilis control; our findings show the importance of pragmatic strategies that facilitate frequent (three-monthly) syphilis testing for PrEP users.

Furthermore, there is an urgent need to maintain frequent syphilis testing among HIV-positive men, intermittent to routine HIV monitoring appointments, as the need for frequent HIV care dissipates.

**Disclosure of Interest Statement:** This work was supported by The Victorian Department of Health and Human Services through support for surveillance projects within the Burnet Institute. The National Health and Medical Research Council provide funding to Margaret Hellard as a Principal Research Fellow (1112297) and Mark Stoové as a Career Development Fellow (1090445). Dr Nick Scott is supported by funding through the Margaret and Jim Beaver Fellowship. This work was supported by the Victorian Operational Infrastructure Support Program.